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INFORMATION ON VACCINES FROM USSR PHARMACOPOEIA

VACCINES FOR HUMANS

Brucellosis Vaccine

This vaccine consists of brucellosis bacteria killed by heating and suspended in a physiological solution. It is administered subcutaneously, intravenously or intramuscularly. The dosage is from 10 million to 10 billion bacterial bodies. The vaccine is effective for one year.

Cholera Vaccine

Cholera vaccine is a suspension in a physiological solution of cholera vibrios, the latter being killed either by heat or by formalin. The vaccine contains 4 billion of these bacterial bodies per milliliter, and is administered subcutaneously. Adults are administered three subcutaneous inoculations in doses of 0.5-1-1 ml. and at intervals of 7-10 days. The dose for children is decreased according to their age (i. e., 1/3, 1/2, or 2/3 of an adult dose). The vaccine is effective for 2 years, but after this time it should be destroyed.

Dysentery Vaccine

Liquid Dysentery Vaccine

The liquid dysentery vaccine is a suspension in a physiological solution of killed Shiga and Flexner dysentery bacteria. It contains 10 billion bacterial bodies per milliliter. The dosage is 10 ml, to be taken internally for 3 consecutive days, on an empty stomach. The full vaccination dose for adults is 300 billion bacterial bodies. The vaccine is effective for 2 years.

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Dry Dysentery Vaccine in Tablet Form

This vaccine consists of desiccated dysentery bacteria killed by formalin. Each tablet weighs 0.1-0.3 g and contains 100 billion killed bacteria. For prophylactic purposes, one tablet per day should be taken for 3 days, on an empty stomach. Children up to 7 years of age should take half a tablet.

Storage: These tablets should be kept in well-stoppered jars sealed with resin and stored in a dry place away from the light. If the tablets have been properly stored, the vaccine's effectiveness is retained indefinitely.

Subcutaneous Dysentery Vaccine

In addition to pentavaccine and polyvaccine, dysentery vaccine and anavaccine are also used for subcutaneous inoculation against dysentery. The two latter vaccines are suspensions in physiological solutions of killed Shiga and Flexner dysentery bacteria (750 million per milliliter in the case of the vaccine, and 1½ billion per milliliter in the case of the anavaccine). Three inoculations, in doses of 0.5-1-1 ml, are administered at intervals of 7-10 days. These vaccines are effective for 2 years.

Gonococcus Vaccine

The polyvalent gonococcus therapeutic vaccine is a suspension of gonococci in a physiological solution. The gonococci have been cultivated on a solid medium and killed either by heating or by the addition of a solution of formalin. The standard vaccine that is put out contains from 200-500 million up to one billion bacterial bodies per milliliter. The vaccine prepared by heating is effective for one year, whereas the vaccine prepared with formalin is effective for 6 months.

Note: In addition to the usual test, the vaccine should be tried out on patients to ascertain the initial therapeutic dose, which should be shown on the label.

Whooping-Cough Vaccine

Whooping-cough vaccine consists of a suspension of killed whooping-cough bacteria in a physiological solution. One ml contains 10 billion bacterial bodies. The vaccine is administered subcutaneously. For children up to one year of age, the initial dose is 0.3 ml; for children over one year of age, it is 0.5 ml. Subsequent doses are 1½-2 times as large as the initial dose. The vaccine is effective for 2 years.

Plague Vaccine

Plague vaccine is prepared from plague bacteria which have been killed by heating or have been attenuated. This vaccine is used solely for prophylaxis of plague.

At present, four types of vaccines are being used:

1. AD-vaccine, which is a suspension of killed bacteria in a sugar solution. The dosage is 0.5-1-1.5 ml administered at intervals of 4-7 days.

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2. Kolle's vaccine, which is a suspension of killed bacteria in a physiological solution. The dosage is 0.5-1-1.5 ml, at intervals of 3-5 days.

3. Haffkine's vaccine, which is a 6-week-old killed bouillon culture. The dosage is 0.5-1.5 ml, at intervals of 3-5 days.

4. Live vaccines from avirulent strains of plague bacteria.

Storage: These vaccines should be stored in a dry place, away from the light, and at a temperature no higher than +4°. They are effective for 1½ years.

Antirabies Vaccine

The vaccine is prepared from the finely ground cerebrum and spinal cord of a rabbit which has been infected with a fixed rabies virus. At present, the most widely accepted vaccines are those of Phillips and Fermi.

1. Phillips' vaccine is a 10% suspension of cerebrum in 75-100% sterilized neutral glycerol. Serious bites require a double dose. The vaccine is effective for 1½ months from the day it is prepared, and for 20 days starting with the day on which it has been shipped to the inoculation point.

2. The Fermi vaccine is a 5% suspension of finely ground rabbit cerebrum in a physiological solution containing 1% phenol.

Inoculations are administered subcutaneously into the abdomen, daily, in doses starting from 1-3 ml and varying in size depending on the age. In cases of serious bites, two inoculations per day are administered. The vaccine is effective for 5 months.

Storage: Both vaccines should be stored away from the light, at a temperature of from +5° to +8°. These vaccines must not be stored at room temperature.

Note: Freezing of the vaccines should be avoided. In case the vaccine is frozen and there is no other vaccine available, the inoculations can be started with thawed vaccine. But for subsequent inoculations, fresh vaccine should be ordered immediately. The vaccine, in its container, should be shaken vigorously before use.

Composite Scarlet-Fever

Composite scarlet-fever vaccine contains 2,000 cutaneous doses of scarlet-fever toxin and one billion killed scarlet-fever streptococci per milliliter. Inoculations are administered three times, subcutaneously. The vaccine is effective for 2 years.

Staphylococcus Vaccine

Staphylococcus vaccine is a suspension in a physiological solution of staphylococci killed either by heat or by formalin. These staphylococci have been freshly obtained from patients. The standard vaccine put out contains one billion bacterial bodies per milliliter. The initial therapeutic dose is 0.2 ml administered subcutaneously, after which the dose is increased, depending on the reaction. Time intervals between inoculations vary from 6 to 12 days, depending on whether or not the effect of the preceding inoculation has worn off. The vaccine is effective for 2 years.

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Polyvalent Streptococcus Vaccine

The streptococcus vaccine is a suspension of killed streptococci in a physiological solution. The vaccine is prepared from several cultures of streptococci isolated from patients afflicted with various diseases of streptococcal origin. There are one billion bacterial bodies per milliliter. The initial dose is 0.3-0.1 ml, with an increase in subsequent inoculations by 0.2 ml. The ampoule containing the vaccine should be shaken before use. The vaccine is effective for 2 years.

Tuberculosis BCG Vaccine

This vaccine is prepared from a suspension of a live, avirulent culture of a tuberculosis bacteria BCG strain.

1. The liquid vaccine is supplied in ampoules containing a single dose of 2 ml. It is kept in a dark place at a temperature from +2° to +10°. The vaccine is effective for 15 days from the day it is prepared.

2. The dry vaccine consists of a suspension of a live BCG culture dried in vacuum. Immediately before being used, it is diluted with cooled, previously boiled, undistilled water in the ratio of 2 ml of water to one dose of vaccine. The dry vaccine is kept in a dark place at a temperature no higher than +8°. It is effective for one year.

Tularemia Vaccine

This vaccine is prepared from live cultures of tularemia bacteria, which have been attenuated by Gayskiy's method. For subcutaneous inoculations, a suspension of tularemia bacteria in a physiological solution is used. Vaccine I, composed of less virulent bacteria, contains 50 million bacteria per milliliter, whereas Vaccine II, prepared from a more virulent strain, contains 25 million tularemia bacteria per milliliter. For children, a vaccine is prepared from strain I. This vaccine contains 10 million bacteria per milliliter. The vaccines are effective for 20 days.

Storage: The vaccines should be kept at a temperature of 0-2°. The vaccine used for cutaneous inoculations by the El'bert method is a live culture of the Gayskiy strain in an egg yolk medium. If kept in a dark, cool place, it is effective for 3 months.

Tetravaccine (Typhoid, Paratyphoid A, Paratyphoid B, and Cholera)

Tetravaccine is a suspension of killed bacteria in a physiological solution. It contains 3 billion bacterial bodies per milliliter. (2 billion of the cholera, 500 million of the typhoid, 250 million of paratyphoid A, and 250 million of paratyphoid B bacteria). It is administered subcutaneously. The adult dosage is 1-2-2 ml, with a 7-10 days' interval between inoculation. Smaller doses are administered to children, depending on their age. The vaccine is effective for 2 years.

Trivaccine (Typhoid, Paratyphoid A, and Paratyphoid B)

Trivaccine is a suspension of typhoid and paratyphoid A and B bacteria in a physiological solution, the bacteria having been killed either by heat or by adding formalin. The vaccine contains 1½ billion bacterial bodies per milliliter (one billion of typhoid, and 250 million each of paratyphoid A and B bacteria). It is administered subcutaneously. The initial inoculation is made in three injections (for adults) of 0.5-1-1 ml, at intervals of 7-10 days. Children receive a smaller dose, depending on their age. During subsequent inoculations, the number of injections is reduced to two and one. The vaccine is effective for 2 years.

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Divaccine (Typhoid and Paratyphoid B)

Divaccine is a suspension of typhoid and paratyphoid B bacteria in a physiological solution. They have been killed either by heating or by adding formalin. It contains 1½ billion bacterial bodies per milliliter (one billion of the typhoid and 500 million of paratyphoid B bacterial bodies). Dianavaccine, in which suspension of bacterial bodies has been treated with formalin, contains 3 billion bacterial bodies per milliliter (2 billion of the typhoid and one billion of paratyphoid B bacterial bodies. The vaccines are administered subcutaneously. The adult dosage is 0.5-1-1 ml, at intervals of 7-10 days. Children are given a smaller dose, according to their age. The vaccines are effective for 2 years.

Variola Vaccine

Variola vaccine consists of material derived from variolar pustules of a calf which have been ground down and diluted with glycerine. They contain the live cow pox virus. The vaccine is issued after passing a bacteriological inspection which ascertains the absence of bacteria dangerous to human beings, and after a determination of its virulence (infective capacity [privivayemost'7) by means of titration on experimental animals, and also by the experimental vaccination of children. The calf lymph is usually dispensed in small bottles which hold 25, 50, or 100 doses. It has the appearance of a grayish-white homogenous emulsion.

Storage: The vaccine should be kept in an icebox or refrigerator at a temperature of +2° to +6°. If stored at room temperature and exposed to the light, it loses its strength. The vaccine should be used up within the period of effectiveness indicated on the label. During warm weather, the vaccine should be shipped under refrigeration.

Pentavaccine

Pentavaccine is a complex preparation consisting of killed bacteria of typhoid fever, paratyphoid A and B, and Shiga's and Flexner's dysentery. One ml of the vaccine contains one billion typhoid, 250 million paratyphoid and 750 million dysentery bacteria. The adult dosage is 0.5-1-1 ml, at intervals of 7-10 days (which may be increased to 20 days). Children, depending on their age, may receive 1/3, 1/2, or 2/3 of the adult dose. The vaccine is effective for 2 years.

Polyvaccine

This preparation contains full antigens of typhoid, paratyphoid A and B, and cholera and dysentery bacteria, plus tetanus anatoxin. It is a yellowish liquid with an amorphous, white calcium phosphate precipitate, which is easily distributed throughout the liquid by shaking. If stored at a temperature not lower than +10°, it is effective for one year. If the undivided crystalline precipitate in the ampoule has separated out to a greater extent than the amorphous precipitate, then the vaccine is not effective.

VETERINARY VACCINES AND SERA

Alum Tetanus Anatoxin

Alum tetanus anatoxin is prepared from the toxin of a tetanus-producing culture, rendered harmless by formalin, and combined with potash alum during heating.

Properties: The anatoxin is a transparent, yellow liquid with a sediment which, when shaken in the bottle, must break down to the most minute suspended particles. It is used for prophylactic purposes, i. e., for active immunization. The dose is 5 ml, administered subcutaneously. The anatoxin is effective for 2 years.

Storage: The anatoxin should be kept in a dry place, away from the light, and at a temperature of from +5° to +15°.

Ovinia Vaccine (Using Borrel's Method)

Properties: This is a transparent or semitransparent liquid with a grayish-white sediment. When shaken, the sediment breaks down into a uniform suspension. The ovinia vaccine is used for the active immunization of sheep against smallpox; it is injected subcutaneously. The dose is one ml. At first, the ampoule containing the preparation is carefully shaken until a uniform mixture is obtained; the preparation is then diluted with a physiological solution in the ratio of 1 to 50. The physiological solution is supplied together with the ovinia vaccine; it is bottled in flasks which are sealed with the sealing-wax stamp of the biologicals factory. The vaccine is effective for 2 years.

Storage: It should be kept in a dry place, away from the light, and at a temperature of +2° to +6°.

Anthrax Vaccines I and II

Tsenkovskiy's vaccines are anthrax spores contained in a 40% solution of glycerol. Tsenkovskiy's vaccine II can be contained in a saponin solution. Tsenkovskiy's anthrax vaccines I and II are prepared from matrices of live anthrax bacteria having varying degrees of reduced virulence, and are obtained by Tsenkovskiy through the application of Pasteur's principle.

Properties: Vaccine I is a transparent liquid which becomes somewhat cloudy after shaking; Vaccine II is a transparent liquid; but the glycoside vaccine (in a saponin solution) is yellowish, becoming somewhat cloudy after shaking. These vaccines are used for prophylactic inoculations as well as for therapeutic treatments. The dose of vaccine I for large animals (horses and cattle) is one ml; the dose of vaccine I for small animals (sheep and goats) is 0.5 ml. The dose of vaccine II for large animals is 0.3-0.5 ml, and for small animals, 0.1 ml. The vaccines are effective for 2 years.

Storage: The vaccines should be kept in a dry place, away from the light, and at a temperature no higher than +15°.

Tissue Toluene Vaccine Against Rinderpest

Tissue toluene vaccine is prepared from the tissue of the parenchymatous organs (spleen, lymphatic nodes, and lungs) of cattle stricken with an acute form of the rinderpest. The toluene vaccine is a fine suspension of organs in 40% glycerol, the latter dissolved in a physiological solution with the addition of toluene.

Properties: The vaccine is a grey-brown liquid. When it stands, particles of the organs settle and the supernatant liquid becomes transparent. The toluene vaccine is injected subcutaneously for the active immunization of cattle against rinderpest. The dose for calves up to one year of age is 3-10 ml; for calves from one to 2 years of age, the dose is 10-20 ml. The dose for an adult animal with a live weight up to 400 kg is 20 ml. An adult animal with a live weight beyond 400 kg will receive a dose equal to one ml for each 20 kg of live weight. The vaccine is effective for 9 months.

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Storage: The vaccine should be kept in a dry place, away from the light, and at a temperature of +2° to +12°.

Vaccine Against Smallpox-Diphtheria of Birds

The vaccine against smallpox-diphtheria of birds (ODP) consists of pulverized, desiccated, variolar scabs (epitheliomae). The vaccine is obtained by infecting pigeons with the smallpox virus, the latter being injected into the exposed cutaneous surface of the thorax. The resulting variolar epitheliomae are removed at the moment of the most pronounced reaction (10-12 days later). The coarsely ground variolar epitheliomae (powder) are pulverized in a mortar to a fine powder, which is then added to (and suspended within) a 25% sterile glycerin solution in the ratio of 1:250. The vaccination is accomplished by rubbing this smallpox vaccine into the featherless portion of the tarsal skin. The vaccine is issued in sealed ampoules. Together with the powdered vaccine, the biologicals factory supplies a sterile 25% glycerin solution, the latter being bottled in flasks which are sealed with the sealing-wax stamp of the biologicals factory. The vaccine is effective for 3 months.

Storage: The vaccine should be kept in a dry place, away from the light, and at a temperature of from +2° to +6°.

Formol Vaccine Against Dysentery of Lambs (LD-Vaccine)

This is a bouillon culture of bacteria which cause dysentery in lambs (Bac. LD), the bacteria having been killed by formalin.

Properties: The vaccine is a yellow liquid with a sediment of bacterial bodies at the bottom of the flask. It is administered subcutaneously to ewes with young. The first inoculation, a dose of 2 ml, is given 20-30 days before lambing; the second inoculation, a dose of 3 ml, is given 10-20 days before lambing. The vaccine is effective for 12 months.

Storage: The vaccine should be kept in a dry place, away from the light, and at a temperature of from +2° to +15°.

Antirabies Vaccine for Farm Animals

This is a 5% suspension of cerebral tissue in a physiological solution, the tissue having been preserved by a 1% solution of phenol. The antirabies vaccine is prepared from the tissue of the cerebrum and the spinal cord of rabbits infected with a fixed rabies virus.

Properties: The vaccine is a semitransparent liquid which, after standing, deposits a sediment. This sediment, when the bottle is shaken, should form a uniform suspension. The vaccine is used for the inoculation of animals bitten by other animals that are either rabid or are suspected of having rabies. The vaccination is administered subcutaneously.

Doses are as follows.

1. For horses and cattle, the individual dose is 10 ml and the daily dose is 20 ml.

2. For young animals up to one year of age and for deer, the individual dose is 5 ml and the daily dose is 10 ml.

3. For sheep, swine, and dogs, the individual dose is 5 ml and the daily dose is 10 ml.

The vaccine is effective for 5 months.

Storage: The vaccine should be kept in a dry place, away from the light, and at a temperature no higher than +8°.

Serum Against Emphysematous Carbuncle

This serum is obtained from cattle by first treating them with a killed, and then a live culture of bacteria which cause emphysematous carbuncle in cattle.

Properties: The serum is a transparent or slightly opalescent yellow liquid, sometimes with a reddish tint, and with a protein sediment settled at the bottom of the flask. For therapeutic purposes, the serum is pre-heated to 37° and injected intravenously in a dose of 200-300 ml. For prophylactic purposes, the serum is administered subcutaneously in a dose of 15-20 ml. The serum is effective for 2½ years.

Serum Against Paratyphoid of Calves (Gaertner's Serum)

This serum is obtained from cattle. The antigen for the hyperimmunization of animals is prepared from 10 strains of Gaertner bacteria extracted from calves that have died from paratyphoid. A bouillon culture, killed by formalin, is used for the hyperimmunization of animals.

Properties: The serum is a transparent or slightly opalescent liquid with a whitish sediment that settles to the bottom of the flask. It is used both prophylactically and therapeutically, and is administered subcutaneously. As a prophylactic measure, newborn calves are given this serum mixed with an equal amount of B. coli serum. The dose is 30 ml. The therapeutic-preventive dose of Gaertner's serum has been set at 30-40 ml; the therapeutic dose is 40-60 ml. The serum is effective for 2 years.

Serum Against Swine Cholera

The serum is obtained by hyperimmunization of swine with hog-cholera virus (virulent blood).

Properties: The serum is a transparent or slightly opalescent liquid, reddish (from partial hemolysis), with an inconsiderable whitish sediment at the bottom of the flask. It is used for both passive and active immunization.

The serum is introduced subcutaneously or intramuscularly.

Individual doses are stepped up according to the weight of animals as follows:

Suckling pigs, 15 ml; swine up to 15 kg, 15-20 ml; swine 15-30 kg, 20-30 ml; swine 30-45 kg, 30-45 ml; swine 45-60 kg, 45-60 ml; swine 60-80 kg, 60-75 ml; and swine weighing over 80 kg, 75-100 ml.

The maximum dose is 150 ml. The serum is effective for 3 years.

Antianthrax Serum

This serum is obtained from horses by the gradual hyperimmunization with a virulent culture of anthrax applied in gradually increasing doses.

Properties: The serum is a transparent, dark straw-yellow liquid with an inconsiderable sediment at the bottom of the flask. It is used both for therapeutic and prophylactic purposes.

Doses of the serum for preventive combined inoculations:

Horses and camels, 10 ml; cattle, 10 ml; and sheep, calves, and swine, 5-8 ml.

Doses of the serum for passive immunization:

Horses and cattle, 15-20 ml; and sheep, calves, and swine, 8-10 ml.

The therapeutic dose administered to adult animals, either subcutaneously or intravenously, is 100-200 ml.

Note: The same serum is administered to persons who have contracted anthrax. The dose is 100-150 ml, administered intramuscularly or intravenously. The serum is effective for 4 years if it has not been heated, and for 3 years if it has been heated.

Serum Against Bacilliary Swine Erysipelas

This serum is obtained mainly from horses by pretreating them with virulent cultures of swine erysipelas bacteria in increasing doses.

Properties: The serum is an opalescent, straw-yellow or greenish liquid with a sediment at the bottom of the flask. For preventive purposes the serum is administered in a dose of 3-20 ml; for therapeutic purposes, it is administered in a single dose of 5-75 ml. The serum is effective for 2 years.

Bivalent Serum Against Colibacillosis and Paratyphoid of Calves

At first, to prepare a bivalent serum, monovalent sera (B. coli and paratyphoid) are obtained by the hyperimmunization of cattle with the appropriate antigen. The bivalent serum is a mixture of equal parts of the monovalent colibacillary and paratyphoid sera.

Properties: The serum is a transparent or slightly opalescent liquid with a whitish sediment which settles to the bottom of the flasks. When the serum is shaken, the sediment forms a uniform suspension. The bivalent serum is administered for prophylactic purposes only to newborn calves during their first days of life. The dose is 30 ml, and is administered subcutaneously. The serum is effective for 2 years.

Sera Against Hemorrhagic Septicemia of Cattle, Sheep, Swine, and Poultry

The serum is obtained from cattle by gradual hyperimmunization with increasing doses first of killed, and then of living bouillon cultures.

Properties: The serum is a transparent or opalescent yellowish liquid, occasionally showing a reddish hue. It is used for passive preventive and therapeutic inoculations of large cattle.

Individual dose for preventive purposes:

Adult cattle, 20-30 ml; calves, 5-10 ml; adult sheep, 15-20 ml; lambs, 5-10 ml; swine, 0-25 ml; and poultry and rabbits, 3-10 ml.

(The size of the dose depends on the weight of the animal.)

For therapeutic purposes, a double dose of the serum is administered. The serum is effective for 2 years.

Serum Against Rinderpest

This serum is obtained by the hyperimmunization of cattle with rinderpest virus (virulent blood).

Properties: The serum is a transparent or slightly opalescent yellow liquid, with a pinkish hue (resulting from hemolysis of the erythrocytes). The presence of a slight protein sediment (which readily forms a uniform suspension when shaken) and of an unwrinkled, opalescent film with a fatty appearance in the upper layer of the liquid are permissible.

The following individual doses of the serum are used for active and passive immunization:

1. For weakly susceptible cattle and for buffaloes (per kilogram of live weight):

Calves up to one year of age, 0.75 ml; young cows (which have not calved), bullock, adult cattle, and buffaloes, 0.5 ml; and cows with calves and emaciated cattle, 1.0 ml.

2. For highly sensitive cattle (Kutaisi cattle and mountain cattle of the Caucasus and Transcaucasia):

Calves up to one year of age and suckling calves, 1.0 ml; young cows (which have not calved), bullocks, and adult cattle, 0.75 ml; and cows with calves and emaciated cattle, 1.5 ml.

3. For cultured breeds of cattle and their cross-breeds (Swiss, Simmenthal, Angeln, Dutch and others):

Suckling calves up to one year of age, 2.0 ml; young cows (which have not calved), bullocks, and adult cattle, 1.5 ml; and cows with calves and emaciated cattle, 3.0 ml.

For active immunization, one ml of the virus is introduced and the serum is administered in the doses indicated above. The serum is effective for 4 years.

Serum Against Paratyphoid of Young Pigs

This serum is obtained from cattle. The antigen for the hyperimmunization of animals is prepared from 3-4 strains of suipestifer bacteria extracted from young pigs which have died from paratyphoid. For the hyperimmunization of animals, a toxic (6- to 10-day growth) bouillon culture is used.

Properties: The serum is a transparent or slightly opalescent liquid. It is administered subcutaneously, and is used for both prophylactic and therapeutic purposes.

Individual doses:

Therapeutic		Prophylactic	
Suckling calves	20-30 ml	Suckling calves	10-15 ml
Those already weaned	40-50 ml	Those already weaned	20-25 ml

The serum is effective for 2 years.

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Serum Against Dysentery of Lambs

This serum is obtained from horses by pretreating them with preparations made from cultures of lamb dysentery.

Properties: The serum is a transparent, slightly opalescent yellow liquid with a protein sediment that settles to the bottom of the flask. For preventive purposes, the serum is administered subcutaneously to newborn lambs, in a dose of 5 ml; for therapeutic purposes, a single dose of 10-20 ml is administered. The serum is effective for one year.

Serum Against Smallpox of Sheep

This serum is obtained by the hyperimmunization of sheep with the smallpox virus (lymph and edematous tissue).

Properties: The serum is a transparent or slightly opalescent liquid, with a yellowish-reddish hue (resulting from partial hemolysis). Some protein sediment is permissible. The serum is used both for passive and active immunization, and is administered subcutaneously.

Individual doses: Lambs up to 15 kg, 10 ml; sheep 15-25 kg, 10-15 ml; and sheep 25-50 kg, 15-25 ml.

The serum is effective for 2 years.

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